

NON-PUBLIC?: N
ACCESSION #: 9010020286
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Seabrook Station PAGE: 1 OF 3

DOCKET NUMBER: 05000443

TITLE: Reactor Trip Due to Loss of Voltage on the Electrohydraulic 24
Volt DC Bus

EVENT DATE: 08/22/90 LER #: 90-022-00 REPORT DATE: 09/21/90

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR
SECTION:

50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:

NAME: Richard R. Belanger, Lead Engineer, Compliance, Extension 4048

TELEPHONE: (603) 347-9521

COMPONENT FAILURE DESCRIPTION:

CAUSE: SYSTEM: COMPONENT: MANUFACTURER:

REPORTABLE NPRDS:

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On August 22, 1990 at 9:19 a.m., EDT, while in MODE 1 at 100% reactor power, a turbine- generator trip with reactor trip occurred. The trip was initiated by an apparent loss of voltage on the Electrohydraulic Control (EHC) 24 volt DC bus during troubleshooting activities. A Main Feedwater Isolation also occurred subsequent to the reactor trip.

A work request was initiated to perform circuit checks in the Early Valve Actuation (EVA) circuitry due to inconsistent operation of the EVA's TEST INTERLOCK light located on the Main Control Board (MCB). Subsequent to initial testing at the MCB, it was decided to continue the testing locally at the EHC cabinet. Two test leads were used to simulate the test signal and to supply 24 volt DC power to the EVA circuit. After the second application of the test leads, a voltage drop occurred on the 24

volt DC trip bus resulting in a turbine-generator trip with reactor trip.

The root cause for the loss of voltage on the EHC 24 volt DC bus could not be conclusively determined, although a contributing factor was the troubleshooting activity associated with the EVA circuit. Personnel error in applying the test leads has not been ruled out but is considered unlikely. New Hampshire Yankee will carefully evaluate all future EHC maintenance activities performed during power operation in order to minimize challenges to plant systems. Additionally, as part of our Trip Avoidance Program, each EHC maintenance activity during power operation will be reviewed on a case-by-case basis, prior to the initiation of work in the field.

With respect to feedwater isolation, a design change has been initiated to install an electronic circuit which will eliminate the effects of the pressure pulses on the steam generator level trip signals.

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On August 22, 1990 at 9:19 a.m., EDT, a turbine-generator trip with a reactor trip occurred while the plant was at 100% reactor power. The turbine trip was initiated by an apparent loss of voltage on the Electrohydraulic Control (EHC) 24 volt DC bus during troubleshooting activities.

Background

Prior to the event, Work Request 90W003810 was initiated to perform circuit checks in the Early Valve Actuation (EVA) circuitry, due to intermittent illumination of the EVA's TEST INTERLOCK light, located on the main control board (MCB). The EVA circuit is normally tested from the MCB by depressing the TEST SELECT pushbutton. When this pushbutton is depressed, it momentarily removes the EVA circuit from the EHC circuit and simulates a fault requiring early valve actuation. If the circuitry test is satisfactory, the EVA TEST INTERLOCK light illuminates. However, the EVA circuitry had not been testing properly as indicated by the inconsistent operation of the test light. Troubleshooting first consisted of testing the circuit twice from the MCB, with different results occurring each time. Subsequent to the first two circuit tests, it was decided that the testing should be performed locally at the EHC cabinet, CP-26, so as not to continue to disturb the MCB operator. Two test leads were installed in CP- 26 to: 1) simulate the TEST SELECT pushbutton signal, and 2) supply 24 volt DC power to the EVA circuit.

Immediately following the second application of these test leads, a voltage drop occurred on the 24 volt DC trip bus resulting in a

turbine-generator trip with reactor trip. The 125 volt DC trip was also energized, as expected, due to the cross-trip function.

Following the turbine trip and reactor trip, a Main Feedwater Isolation JB! occurred. In addition to the expected low T avg signal, high-high steam generator level spikes in all four steam generators generated the P-14 signal that resulted in the feedwater isolation. Actual steam generator water levels did not approach the high-high setpoint at any time.

Safety Consequences

There were no adverse safety consequences as a result of this event. All the applicable trips and interlocks associated with the reactor trip and feedwater isolation functioned as designed.

All operator actions were determined to be appropriate to ensure the safety of the plant. At no time during this event was there any impact on the health and safety of plant employees or the public.

Root Cause

The root cause for the loss of voltage on the EHC 24 volt DC bus could not be conclusively determined. A contributing factor to the loss of voltage was the troubleshooting activities associated with the EVA circuit. Personnel error in applying the test leads has not been ruled out but is considered unlikely. This is based on extensive interviews of the Instrument and Control (I&C) Technicians and the EHC System Engineer involved, as well as a review of the cautious troubleshooting technique used so as not to disturb the EHC circuitry. Additionally, these individuals were familiar with the equipment from prior experience and training.

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During the troubleshooting activities, the K-3 relay board associated with the EVA logic board was replaced because the mercury wetted relays on the K-3 board were determined to have the potential to cause the problem. The original relay board was later reinstalled and tested, but the problem could not be repeated. Subsequently, the new relay board was reinstalled so the original board could be taken to the I&C shop for further bench testing. The results of the bench testing were inconclusive and no problems were identified.

Corrective Actions

After the trip, the plant was placed in HOT STANDBY in accordance with operating procedure OS1000.11, "Post Trip to HOT STANDBY". An event evaluation and post trip review were immediately initiated and completed before restart of the reactor. A Human Performance Evaluation System (HPES) analysis as well as a root cause analysis were also initiated and completed.

Prior to exceeding 20% power, an evaluation of troubleshooting activities was conducted by an EHC vendor representative to ensure that all potential causes for the voltage loss were examined. The vendor representative also monitored the EHC system during plant restart. No additional problems related to the EHC system were identified. However, in the future, New Hampshire Yankee will carefully evaluate all EHC maintenance activities performed during power operation in order to minimize challenges to plant systems. Additionally, as part of our Trip Avoidance Program, each EHC maintenance activity will be reviewed on a case-by-case basis, prior to the initiation of work in the field.

With respect to the feedwater isolation signal, a design change was initiated to install an electronic circuit that will eliminate the effects of the pressure pulses on the steam generator level trip signals. This design change is scheduled to be completed prior to restart following the first refueling outage.

Plant Conditions

At the time of this event, the plant was in MODE 1, Power Operation at 100%, with an RCS temperature of 587.5 degrees Fahrenheit and pressure of 2,235 psig.

This is the second event at Seabrook Station where a spurious signal of the EHC system caused a reactor trip with a subsequent feedwater isolation. The previous event was reported by LER No. 90-018-00.

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New Hampshire Ted C. Feigenbaum
Senior Vice President and
Chief Operating Officer

NYN-90175

September 21, 1990

United States Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Document Control Desk

References: Facility Operating License No. NPF-86, Docket No. 50-443

Subject: Licensee Event Report (LER) No. 90-022-00: Reactor Trip Due to Loss of Voltage on the Electrohydraulic 24 Volt DC Bus

Gentlemen:

Enclosed please find Licensee Event Report (LER) No. 90-022-00 for Seabrook Station. This submittal documents an event which occurred on August 22, 1990, and is being reported pursuant to 10CFR50.73(a)(2)(iv).

Should you require further information regarding this matter, please contact Mr. Richard R. Belanger at (603) 474-9521, extension 4048.

Very truly yours,

Ted C. Feigenbaum

TCF:WJT/dma

Enclosures: NRC Forms 366, 366A

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United States Nuclear Regulatory Commission New Hampshire Yankee
Attention: Document Control Desk Page two

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